



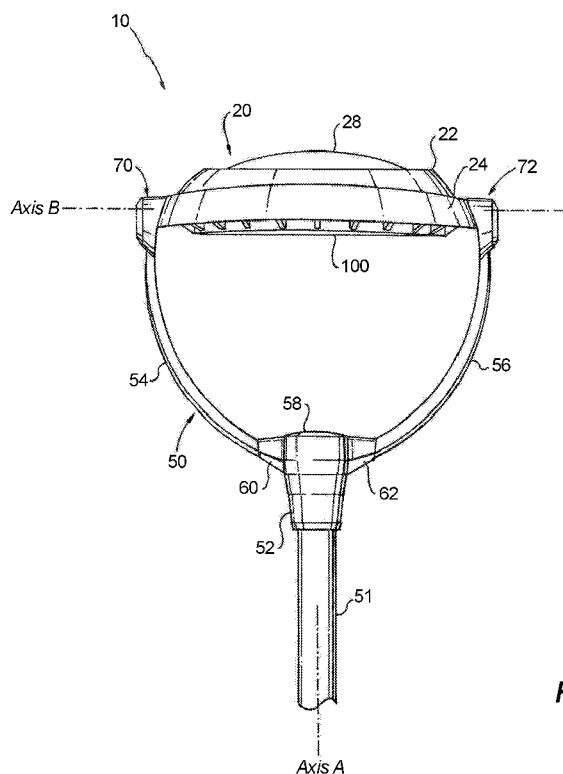
- (51) **International Patent Classification:**
F21S 8/08 (2006.01) F21S 8/00 (2006.01)
- (21) **International Application Number:**
PCT/US2016/030205
- (22) **International Filing Date:**
29 April 2016 (29.04.2016)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
- | | | |
|------------|----------------------------|----|
| 62/155,293 | 30 April 2015 (30.04.2015) | US |
| 62/155,264 | 30 April 2015 (30.04.2015) | US |
| 62/155,166 | 30 April 2015 (30.04.2015) | US |
| 62/156,251 | 2 May 2015 (02.05.2015) | US |
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(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** FLEXIBLE HOUSING ASSEMBLY FOR SSL LIGHT FIXTURES**Fig. 1**

(57) **Abstract:** The present disclosure provides solid state lighting fixtures and housing assemblies for solid state lighting fixtures. The housing assemblies according to the present disclosure include multiple joints to permit manipulation of the housing assembly relative to its mounting structure so that a single solid state lighting fixture can be used with different mounting structures, and adjusted so that the light emitted by the solid state lighting fixture is in a desired direction.

FLEXIBLE HOUSING ASSEMBLY FOR SSL LIGHT FIXTURES

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority to co-pending U.S. Provisional Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” co-pending U.S. Provisional Application No. 62/155,166, filed on April 30, 2015, titled “Solid State Light Fixtures with Integrated Controls,” co-pending U.S. Provisional Application No. 62/155,293, filed on April 30, 2015, titled “Control Device for Solid State Light Fixtures,” and co-pending U.S. Provisional Application No. 62/156,251, filed on May 2, 2015, titled “Solid State Lighting Fixtures,” all of which are hereby incorporated herein by reference in their entireties.

BACKGROUND

Field

[001] The present disclosure relates to solid state lighting fixtures. More particularly, the present disclosure relates to housing assemblies for solid state lighting fixtures that include multiple joints to permit manipulation of the housing assembly to accommodate different mounting structures and adjust the direction of light emitted by fixture.

Description of the Related Art

[002] Luminaires (light fixtures) utilizing light emitting diodes (LEDs) have in recent years become somewhat practical and continue to penetrate the lighting market due to the increased luminous efficacy of commercially available LED components. LED luminaires are desirable as they offer customers energy savings due to good luminous efficacy combined with the ability to

precisely control light distribution patterns, which is of particular importance for certain lighting scenarios, such as outdoor environments, and open environments, such as parking garages and canopies. Another benefit of LED luminaires is that with the right control mechanism the LEDs are controllable. Each LED luminaire can start-up (i.e., illuminate) on a near-instantaneous basis, and may be dimmed to any level within the driver's operational range by varying the current through each LED via dimming drivers, e.g. power supplies, that offer dimming leads accepting the standard 0-10V input format.

[003] Further energy savings of LED luminaires can be realized by providing light only where and when needed. For example, LED luminaires can be dimmed or turned off until motion is detected in an area. The LED luminaires can also be dimmed according to a time of day, or set to illuminate at full brightness from dusk through midnight or another time, and then dimmed, saving energy, but still providing an acceptable level of lighting for overnight security purposes. Selective dimming or on/off operation of LED luminaires also retards lumen depreciation and extends the service life of the LED luminaires.

[004] Housings for solid state lighting fixtures are typically designed to rigidly mount to a wall, ceiling, pole or other mounting structure, and remain in a fixed orientation relative to the mounting structure. As a result, such fixtures have a single utility in that they can only be attached to the mounting structure they were designed for.

SUMMARY

The present disclosure provides solid state lighting (SSL) fixtures and housing assemblies for solid state lighting (SSL) fixtures. The housing assemblies according to the present disclosure include multiple joints to permit manipulation of the housing assembly relative to its mounting structure. In an exemplary embodiment, the SSL fixture includes a main body and a mounting assembly. The main body includes a housing and a light assembly within the housing. The mounting assembly has a first mounting joint for securing the mounting assembly to a mounting structure, at least one main body support member having one end secured to the first mounting joint, and at least one second mounting joint for coupling the at least one main body

support member to the main body. The first mounting joint provides a first articulating joint for adjusting the position of the main body, and the second mounting joint provides a second articulating joint for adjusting the position of the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

[005] The figures depict embodiments for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures illustrated herein may be employed without departing from the principles described herein, wherein:

[006] Fig. 1 is a side view of an SSL fixture according to some embodiments of the present disclosure, illustrating the SSL fixture adjusted for upright mounting;

[007] Fig. 2 is another side view of the SSL fixture of Fig. 1;

[008] Fig. 3 is a perspective view of the SSL fixture of Fig. 1;

[009] Fig. 4 is another perspective view of the SSL fixture of Fig. 1, illustrating the SSL fixture adjusted for side mounting;

[0010] Fig. 5 is a side view of the SSL fixture of Fig. 4;

[0011] Fig. 6 is a top plan view of the SSL fixture of Fig. 4;

[0012] Figs. 7-10 illustrate exemplary mounting brackets for the SSL fixture according to some embodiments of the present disclosure;

[0013] Fig. 11 is a top plan view of the main body of the SSL fixture of Fig. 1;

[0014] Fig. 12 is a perspective view of the top of the main body of the SSL fixture of Fig. 1, illustrating a top cover of the main body removed;

[0015] Fig. 13 is a side view of the main body of the SSL fixture of Fig. 1, illustrating the top cover removed;

[0016] Fig. 14 is another side view of the main body of the SSL fixture of Fig. 1;

[0017] Fig. 15 is a bottom plan view of the main body of the SSL fixture of Fig. 1;

[0018] Fig. 16 is a block diagram of an embodiment of an SSL light assembly;

[0019] Fig. 17 is a block diagram of another embodiment of an SSL light assembly with on-board sensors;

[0020] Fig. 18 is a block diagram of yet another embodiment of an SSL light assembly with an external motion sensor;

[0021] Fig. 19 is a block diagram of an embodiment of an SSL system; and

[0022] Fig. 20 is a block diagram of another embodiment of an SSL system.

DETAILED DESCRIPTION

[0023] The present disclosure provides solid state lighting (SSL) fixtures and housing assemblies for solid state lighting (SSL) fixtures. The housing assemblies according to the present disclosure include multiple joints to permit manipulation of the housing assembly relative to its mounting structure so that a single SSL fixture can be used with different mounting structures, and adjusted so that the light (visible and/or non-visible light) emitted by the SSL fixture is in a desired direction. For example, the SSL fixture can be positioned for post top mounting, the SSL fixture can be positioned for arm mount if the yoke is rotated to a horizontal position, or the SSL fixture can be positioned as a flood light if the fixture is rotated around the yoke in the post top position or the arm mount position.

[0024] Referring to Figs. 1-3, various views of an SSL fixture 10 according to the present disclosure are shown. In this exemplary embodiment, the SSL fixture 10 is configured for upright mounting (or post top mounting) on, for example, a pole as the mounting structure. In

Figs. 1-3, the SSL fixture 10 includes a main body 20 and a mounting assembly 50. The main body 20 includes a housing 22 and an SSL light assembly 100 that will be further described below with regard to Figures 16-18. In this exemplary embodiment, the housing 22 includes an outer housing portion 24 and an inner housing portion 26 (seen in Fig. 12). The main body housing 22 can be made of metal, such as aluminum, die cast aluminum, stainless steel, galvanized steel or powder coated steel, or other rigid material to provide sufficient structural integrity and provide direct convective heat exchange between the SSL light assembly 100 and the ambient air, especially via heat dissipating fins in the housing portions. The outer housing portion is used to couple the main body 20 to the mounting assembly 50, and acts as a protective outer shell to protect the SSL light assembly within the housing 22 from the elements and damage. The outer housing portion 24 includes a cover 28 that provide access to the inner housing portion 26 of the housing 22. The inner housing portion 26 is used to support the components of the SSL light assembly 100.

[0025] The mounting assembly (or yoke) 50 includes a mounting joint, such as slip fitter 52, and a pair of main body support members 54 and 56. The slip fitter 52 is provided to connect the SSL fixture 10 to a mounting structure 51, such as the pole identified above. Preferably, the slip fitter 52 has a hollow center for electrical power connections and/or to allow wires to pass, and a cover 58 to permit access to the hollow center. The slip fitter 52 includes body support retaining members 60 and 62 that are configured to receive and support the main body support members 54 and 56 relative to the slip fitter 52, as shown. The slip fitter 52 can be made of metal, such as aluminum, die cast aluminum, stainless steel, galvanized steel or powder coated steel, or rigid plastic or composite materials to provide sufficient structural integrity. The slip fitter 52 may be releasably secured to a mounting structure, e.g., pole 51 or a tenon, such that the slip fitter can be rotated relative to Axis "A", and thus relative to the mounting structure supporting the SSL fixture 10. In an alternative embodiment, the slip fitter 52 can be a two-piece member where a first member is used to secure the slip fitter 52 to the mounting structure, and the second member is coupled to the first member via a swivel joint that can be locked in place using a set screw.

[0026] The main body supports 54 and 56 secure the main body 20 to the slip fitter 52. Preferably, the main body supports 54 and 56 are rigid, hollow members that permit power wires

to pass from the slip fitter 52 to the main body 20. Each of the main body supports 54 and 56 may be a single member with a hollow center, or a two piece member that is secured together via a fastener such as a rivet, bolt, screw or adhesive. The main body supports 54 and 56 can be made of metal, such as aluminum, die cast aluminum, stainless steel, galvanized steel or powder coated steel, plastics, composite materials, or other rigid material to provide sufficient structural integrity. The embodiment of Figs. 1-3 depict two main body supports, however, the SSL fixture 10 according to the present disclosure may use a single main body support or a plurality of main body supports.

[0027] The main body 20 is secured to the main body supports 54 and 56 via mounting joints 70 and 72. The mounting joints permit manipulation of the main body 20 relative to the slip fitter 52, and thus relative to a mounting structure supporting the SSL fixture 10. The mounting joints 70 and 72 are preferably locking type mounting joints, such as locking knuckle joints, locking swivel joints, locking ball joints and adjustable locking hinges. In the embodiment of Figs. 1-3, the mounting joints 70 and 72 are knuckle joints between the main body 20 and each main body support member 54 and 56. The knuckle joints allow rotation of the main body 20 about the knuckle joint. In this exemplary embodiment, the knuckle joint 70 or 72 uses locking teeth or serrations on opposing faces of the knuckle joint halves, such that one set of locking teeth are on the main body and the other set of locking teeth are on the main body support member. A screw 74 through the axis of the knuckle joint, which is along Axis B, holds the opposing locking teeth together once the main body 20 of the SSL fixture 10 has been positioned and the screw 74 has been tightened.

[0028] As noted above, in the embodiment of Figs. 1-3 the SSL fixture 10 is configured for upright mounting (e.g., post top mounting) to, for example, a pole as the mounting structure. In the embodiment of Figs. 4-6, the SSL fixture 10 is configured for arm mounting to, for example an exterior wall, via a mounting bracket 80 as the mounting structure. Examples of arm mounting configurations are provided in Figs. 7-10. Referring to Figs. 7-9, the mounting bracket 80 includes a flat wall mounting plate 82 and a tenon 84. The wall mounting plate 82 is secured to a wall, and the tenon 84 fits within the slip fitter 52 and can be secured to the slip fitter 52 with set screws, after the main body is positioned. Referring to Fig. 10, the wall bracket 80 is U-

shaped bracket secured to the slip fitter 52 via, for example, a nut and bolt. The wall bracket 80 can be secured to a ceiling, wall or other structure to support the SSL fixture 10.

[0029] Referring to Figs. 11-16, an SSL light assembly 100 according to one embodiment of the present disclosure is shown. In this exemplary embodiment, the SSL light assembly 100 includes an SSL light engine 102, a wireless module 104, a voltage regulator 106, a real-time clock (RTC) 108, status sensors 110, dimming output control 112, battery back-up 114 and driver (or dc power supply) 116. The SSL light engine 102 has one or more SSL elements 103 used to illuminate a desired area. The SSL elements 103 may include any solid state lighting element, such as an LED lighting element. Preferably, the SSL light engine 102 includes a plurality of SSL elements 103 mounted to a printed circuit board referred to herein as primary board 105 in an array or other configuration capable of lighting a desired area. The SSL light engine 102 and primary board 105 are enclosed in the main body housing 22 for installation in a commercial, industrial, or residential environment either indoors or outdoors.

[0030] The SSL light engine 102 illuminates when energized by driver 116, and can be dimmed or brightened depending upon the voltage applied to the driver dimming input via the SSL light engine 102 under the control of the dimming output control 112. An example of a suitable driver is the PLED150W-042-C3500-D3 Driver manufactured by Thomas Research Products. Another example of a suitable driver is shown in Figs. 35 and 36 of Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled "Flexible Housing Assembly for SSL Light Fixtures," incorporated herein by reference. Dimming control is in the pulse width modulated (PWM) format. The driver 116 is capable of driving the SSL light engine 102 down to zero current, i.e. extinguished, where the auxiliary power supply takes over to supply power to the wireless module, since no electrical current would be available from the SSL element 103 strings to support the wireless module controls. The wireless module 104 is configured to transmit signals to the controller 210 (seen in Fig. 19), and receive signals from the controller 210 via wireless network 220. Voltage regulator 106 maintains a constant voltage supply, e.g., 3.3 volts, for the wireless module 104. The status sensors 110 are used to measure certain operating characteristics of the SSL light assembly 100, and may include temperature sensors, and sensors to measure current and voltage (including dim voltage). Measurements from the status sensors

110 are transmitted to the controller 210 via wireless module 104. The battery back-up 114 supplies power to the RTC 108 when power is otherwise unavailable to the RTC 108, e.g., when there is a power outage or power to the SSL fixture is turned off. The battery back-up 114 enables the RTC to maintain accurate time so that the wireless module can perform scheduled operations without the need to reprogram the RTC. Embodiments of detailed circuit diagrams to implement the components disclosed in Fig. 16 are provided in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference.

[0031] Referring to Fig. 17, an SSL light assembly 100 according to another embodiment of the present disclosure includes an SSL light engine 102, a wireless module 104, a voltage regulator 106, a real-time clock (RTC) 108, status sensors 110, dimming output control 112, battery back-up 114, driver (or dc power supply) 116 and one or more sensors 118, such as motion, and light or photo sensors. The SSL light engine 102 illuminates when energized by driver 116, and can be dimmed or brightened depending upon the voltage applied to the driver dimming input via the SSL light engine 102 under the control of the dimming output control 112. An example of a suitable driver is the PLED150W-042-C3500-D3 driver manufactured by Thomas Research Products. Another example of a suitable driver is described above with reference to Figs. 35 and 36 in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference. The wireless module 104 is configured to transmit signals to the controller 210 (seen in Fig. 19), and receive signals from the controller 210. Voltage regulator 106 maintains a constant voltage supply, e.g., 3.3 volts, for the wireless module 104. The status sensors 110 are used to measure certain operating characteristics of the SSL light assembly 100, and may include temperature sensors, and sensors to measure current and voltage (including dim voltage). Measurements from the status sensors 110 are transmitted to the controller 210 via wireless module 104. The battery back-up 114 supplies power to the RTC 108 when power is otherwise unavailable to the RTC, e.g., when there is a power outage or power to the SSL fixture is turned off. The battery back-up 114 enables the RTC to maintain accurate time so that the wireless module can perform scheduled operations without the need to reprogram the RTC. The motion and/or photo sensors 118 can be used to control activation, deactivation or adjustment (e.g., dimming) of one or more

SSL fixtures 10 within the SSL system 200 described below. An embodiment of a detailed circuit diagram to implement the components disclosed in Fig. 17 is provided in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference.

[0032] Referring to Fig. 18, an SSL light assembly 100 according to another embodiment of the present disclosure includes an SSL light engine 102, a wireless module 104, a voltage regulator 106, a real-time clock (RTC) 108, status sensors 110, dimming output control 112, battery back-up 114, driver (or dc power supply) 116, and a motion sensor interface 120 in communication with an off the shelf motion sensor 122 enclosed within the SSL light assembly 100. The SSL light engine 102 illuminates when energized, and can be dimmed or brightened depending upon the voltage applied to the driver dimming input via the SSL light engine 104 under the control of the dimming output control 112. An example of a suitable driver is the PLED150W-042-C3500-D3 driver manufactured by Thomas Research Products. Another example of a suitable driver is described above with reference to Figs. 35 and 36 of Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference. The wireless module 104 is configured to transmit signals to the controller 210 (seen in Fig. 19) and receive signals from the controller 210, via the wireless network 220. Voltage regulator 106 maintains a constant voltage supply, e.g., 3.3 volts, for the wireless module 104. The status sensors 110 are used to measure certain operating characteristics of the SSL light assembly 100, and may include temperature sensors, and sensors to measure current and voltage (including dim voltage). Measurements from the status sensors 110 are transmitted to the controller 210 via wireless module 104. The battery back-up 114 supplies power to the RTC 108 when power is otherwise unavailable to the RTC, e.g., when there is a power outage or power to the SSL fixture is turned off. The battery back-up 114 enables the RTC 108 to maintain accurate time so that the wireless module can perform scheduled operations without the need to reprogram the RTC. In this embodiment, the motion sensor interface 120 is configured to interface with off the shelf motion sensors and provides signals to the wireless module 104 and can be used to control activation, deactivation or adjustment of one or more SSL fixtures 10 within the SSL system 200 described below. An embodiment of a detailed circuit diagram to implement the components disclosed in Fig. 18 is

provided in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference.

[0033] Referring to Figs. 19 and 20, the SSL garage or canopy lighting system 200 (also referred to herein as SSL system) according to an exemplary embodiment of the present disclosure includes at least one SSL fixture 10, a controller 210 that can be used to program or otherwise provide commands, instructions, or program code to each SSL fixture 10 and a wireless network 220 interconnecting each device within the SSL system 200. Preferably, the SSL system 200 includes a plurality of SSL fixtures 10, as seen in Fig. 19. Examples of suitable controllers 210 include personal computers, mobile computing devices, such as a smartphone or tablets, or dedicated fixed or portable computing devices capable of providing real-time control of one or more SSL fixtures used to illuminate a desired area. The controller 210 may communicate to the wireless network 220 through, for example, a bridge node. The bridge node may be a USB wireless adapter, such as the Snap Stick 200 USB dongle manufactured by Synapse. The wireless network 220 is preferably a mesh network, which is also capable of communicating with individual SSL fixtures 10 that are outside the mesh network. When communicating with individual SSL fixtures outside the mesh network, SSL fixtures can be controlled by the controller 210 when it is in close proximity to the SSL fixture and using, for example, the USB wireless adapter (e.g., the SNAP Stick 200 USB dongle). Fig. 20 is an embodiment of the SSL system 200 similar to the embodiment of Fig. 19, except the SSL system also includes one or more sensors 230, such as a light sensor, or motion sensor, or a combination of sensors. The sensors 230 are external to the SSL fixtures 10, and are used to control one or more SSL fixtures via the wireless network 220. A more detailed description of the controller 210 and wireless network 220 is provided in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference.

[0034] The signals sent to the wireless module 104 by the controller 210, via the wireless network 220, may include generally, user commands, such as set schedule command, manual control of fixture, turn fixture off, turn fixture on, dim fixture, set schedule to automatically dim fixture, or to activate fixture upon one or more sensor responses. Such commands can be sent to

one SSL fixture 10 or to more than one SSL fixture. Signals sent to the controller 210 by the wireless module 104 may include diagnostic information from, for example, the status sensors 110, such as printed circuit board temperature, the number of kilowatt hours the SSL fixture has been operating, the RTC time, and other information reflecting that one or more SSL fixture components are not functioning properly and are in need of repair, such as RTC status, battery status, etc. Signals sent to the controller 210 by the wireless module 104 may also include acknowledgements that commands from the controller have been received. The real-time clock (RTC) 108 provides a suitably accurate clock to the SSL fixture 10 components to ensure timing operations are performed at a desired time of day. More details of these components are described in Appendix A of Patent Application No. 62/155,264, filed on April 30, 2015, titled “Flexible Housing Assembly for SSL Light Fixtures,” incorporated herein by reference.

[0035] It will be understood that various modifications can be made to the embodiments of the present disclosure herein without departing from the spirit and scope thereof. Therefore, the above description should not be construed as limiting the disclosure, but merely as embodiments thereof. Those skilled in the art will envision other modifications within the scope and spirit of the invention as defined by the claims appended hereto.

CLAIMS

What is claimed is:

1. An SSL fixture for illuminating a desired area, comprising:

a main body having a housing and a light assembly within the housing; and

a mounting assembly having a first mounting joint for securing the mounting assembly to a mounting structure, at least one main body support member having one end secured to the first mounting joint, and at least one second mounting joint for coupling the at least one main body support member to the main body,

wherein the first mounting joint provides a first articulating joint for adjusting the position of the main body, and wherein the at least one second mounting joint provides a second articulating joint for adjusting the position of the main body.
2. The SSL fixture according to claim 1, wherein the at least one main body support member comprises a pair of main body support members.
3. The SSL fixture according to claim 2, wherein the at least one second mounting joint comprises a pair of second mounting joints, wherein one mounting joint couples one main body support member to the main body, and wherein the other mounting joint couples the other main body support member to the main body.
4. The SSL fixture according to claim 1, wherein the first mounting joint comprises a yoke capable of being moved relative to the mounting structure.
5. The SSL fixture according to claim 1, wherein the at least one second mounting joint comprises a locking knuckle joint.
6. The SSL fixture according to claim 1, wherein the at least one second mounting joint comprises a locking swivel joint.

7. The SSL fixture according to claim 1, wherein the light assembly comprises an SSL light engine.

8. The SSL fixture according to claim 7, wherein the SSL light engine comprises a plurality of SSL elements capable of illuminating a desired area.

9. The SSL fixture according to claim 8, wherein the plurality of SSL elements can be activated or dimmed in response to control signals.

10. The SSL fixture according to claim 9, wherein control signals comprise at least one set time control signal.

11. The SSL fixture according to claim 9, wherein control signals comprise a date control signal.

12. The SSL fixture according to claim 1, wherein the light assembly further comprises a wireless module used for communicating with a controller using a wireless network.

13. An SSL fixture for illuminating a desired area, comprising:

a main body having a housing and a light assembly within the housing, the light assembly including a plurality of LEDs; and

a mounting assembly having a first mounting joint rotatable around a first axis for securing the mounting assembly to a mounting structure, at least one main body support member having one end secured to the first mounting joint, and at least one second mounting joint rotatable around a second axis different than the first axis for coupling the at least one main body support member to the main body,

wherein the first mounting joint provides a first articulating joint for adjusting the position of the main body, and wherein the at least one second mounting joint provides a second articulating joint for adjusting the position of the main body.

14. The SSL fixture according to claim 13, wherein the at least one main body support member comprises a pair of main body support members.

15. The SSL fixture according to claim 14, wherein the at least one second mounting joint comprises a pair of second mounting joints, wherein one mounting joint couples one main body support member to the main body, and wherein the other mounting joint couples the other main body support member to the main body.

16. The SSL fixture according to claim 13, wherein the first mounting joint comprises a yoke capable of being moved relative to the mounting structure.

17. The SSL fixture according to claim 13, wherein the at least one second mounting joint comprises a locking knuckle joint.

18. The SSL fixture according to claim 13, wherein the at least one second mounting joint comprises a locking swivel joint.

19. The SSL fixture according to claim 13, wherein the light assembly comprises an SSL light engine.

20. An SSL fixture for illuminating a desired area, comprising:

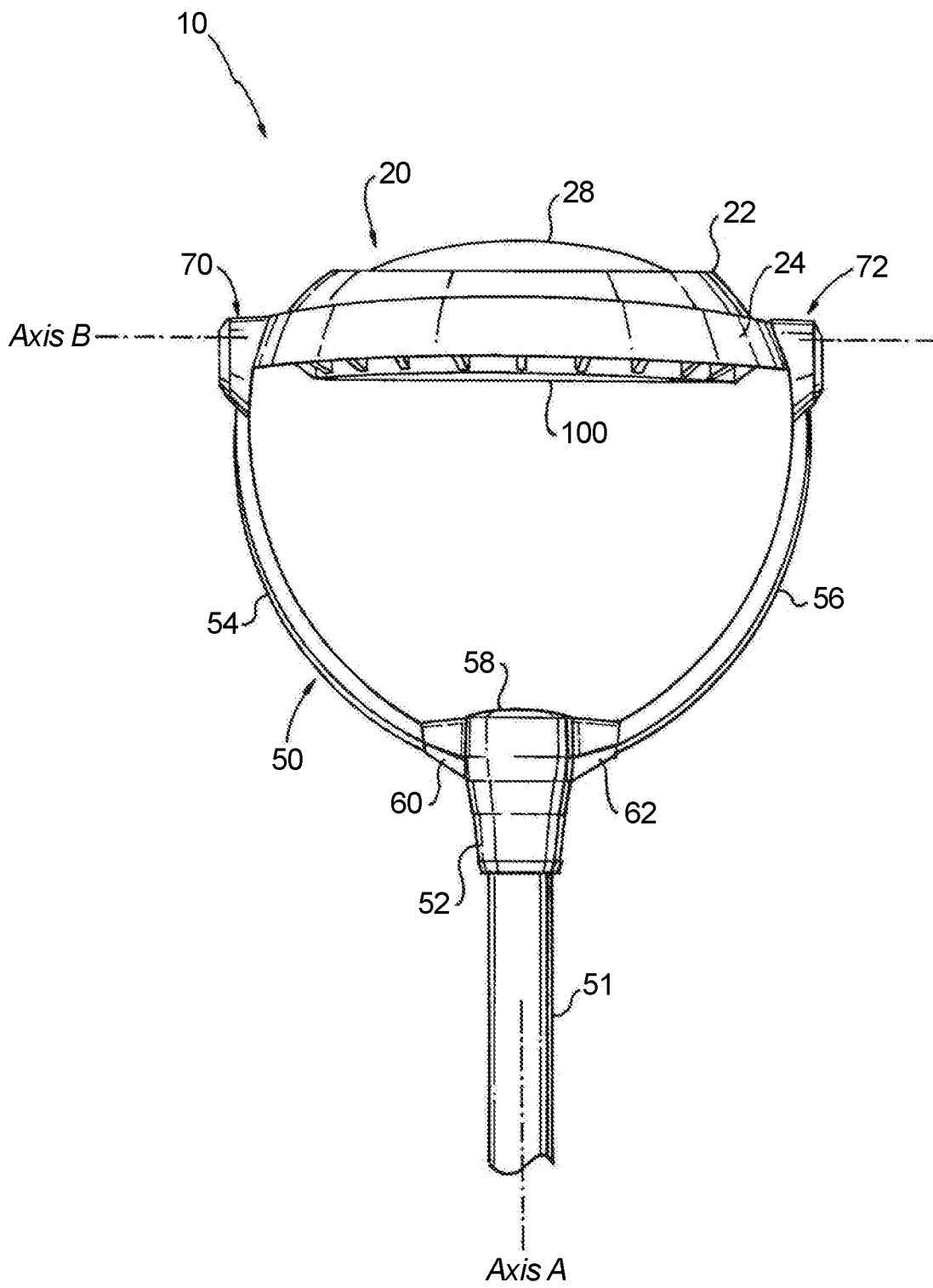
a main body having a housing and a light assembly within the housing, the light assembly including an SSL light engine and a plurality of LEDs; and

a mounting assembly having a first mounting joint rotatable around a first axis for securing the mounting assembly to a mounting structure, at least one main body support member having one end secured to the first mounting joint, and at least one second mounting joint rotatable around a second axis different than the first axis for coupling the at least one main body support member to the main body,

wherein the at least one second mounting joint comprises a pair of second mounting joints, wherein one mounting joint couples one main body support member to the main body, and wherein the other mounting joint couples the other main body support member to the main body, and

wherein the first mounting joint provides a first articulating joint for adjusting the position of the main body, and wherein the at least one second mounting joint provides a second articulating joint for adjusting the position of the main body.

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**Fig. 1**

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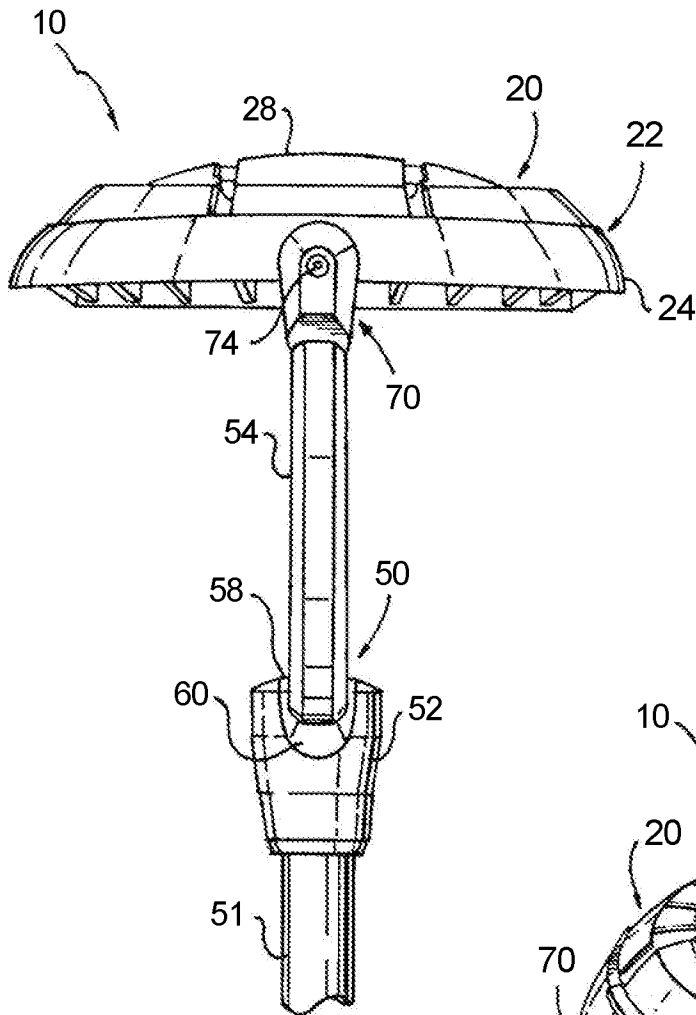


Fig. 2

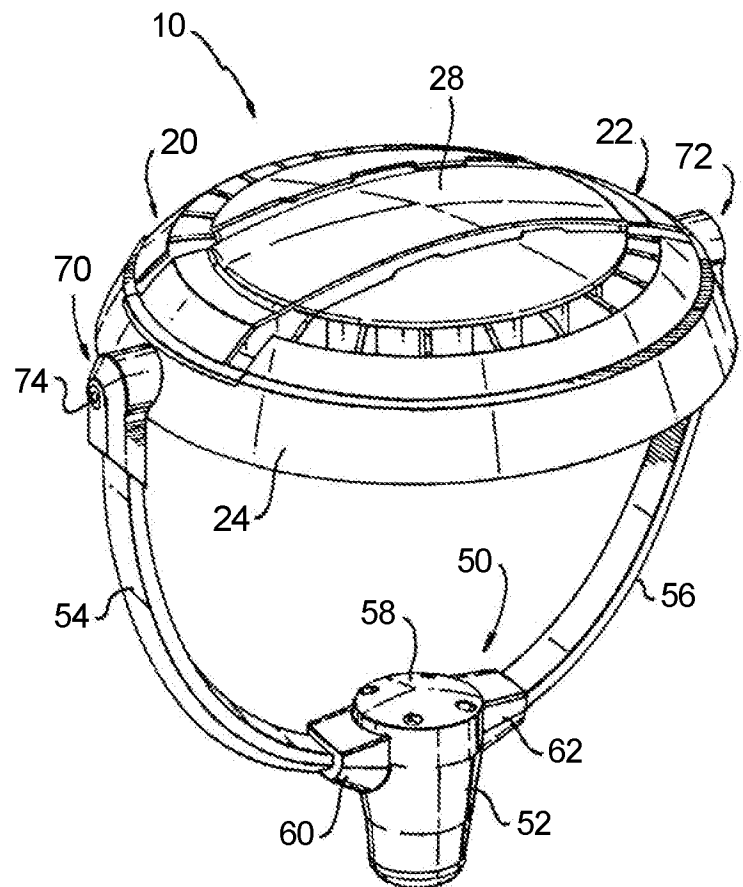


Fig. 3

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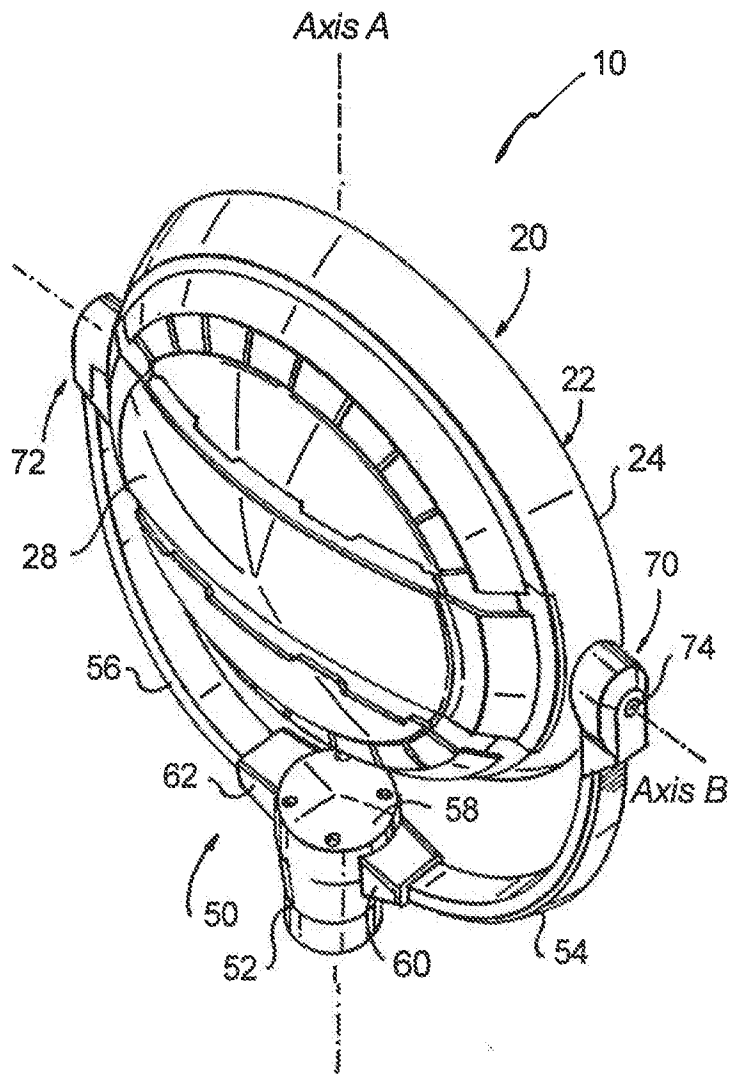


Fig. 4

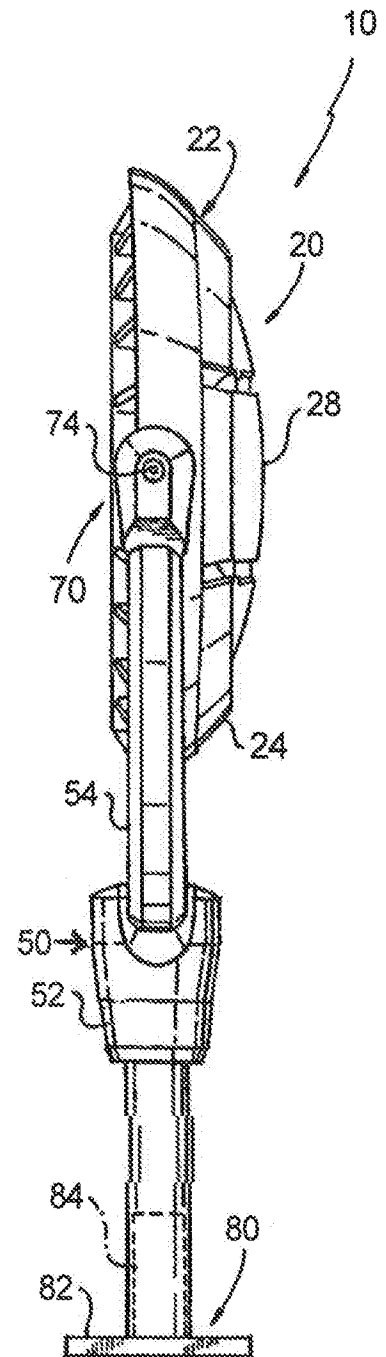
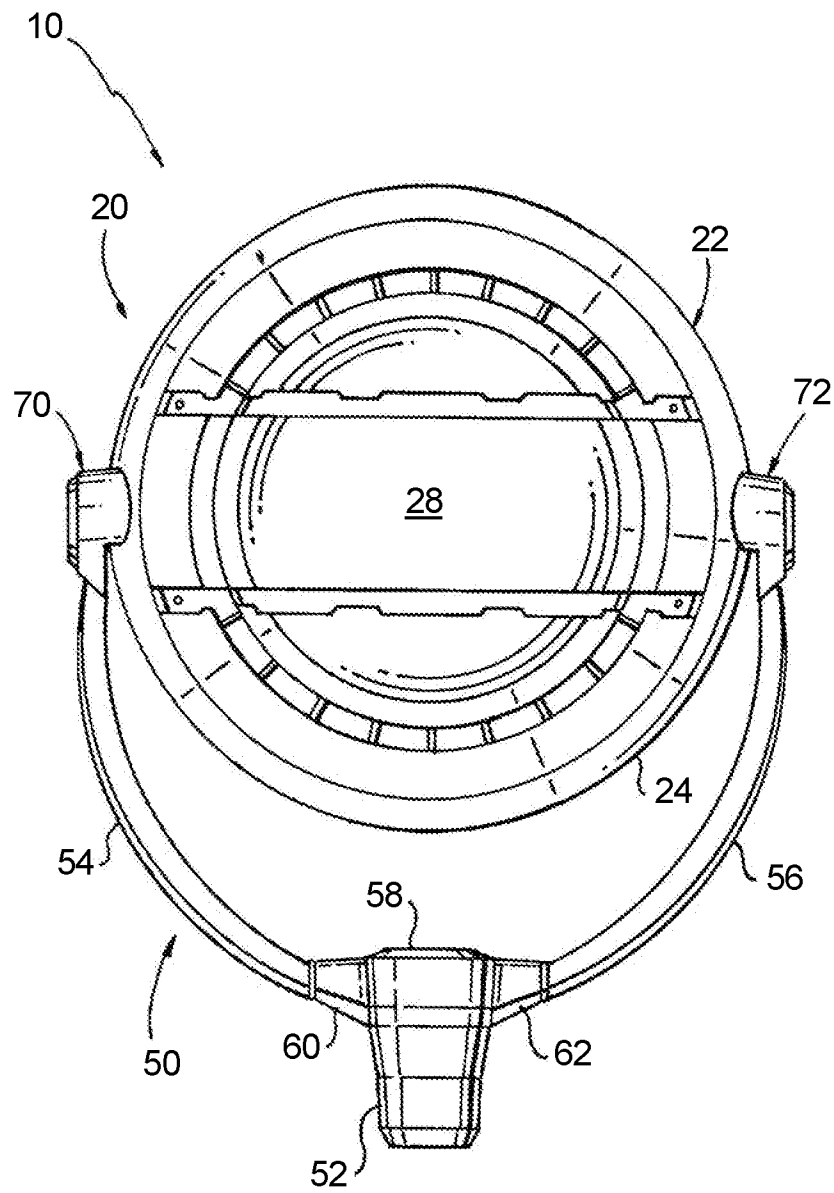


Fig. 5

**Fig. 6**

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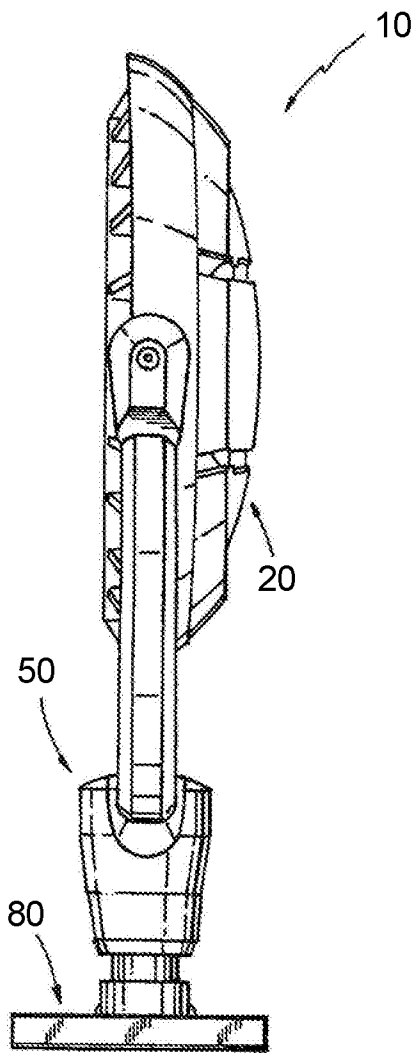


Fig. 7

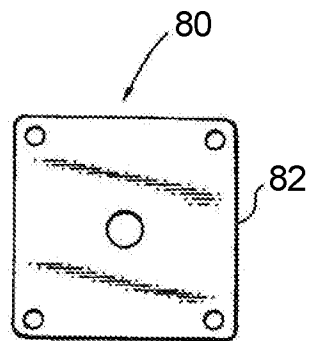


Fig. 8

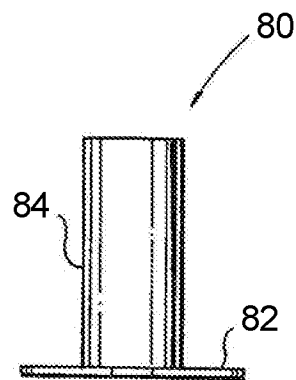


Fig. 9

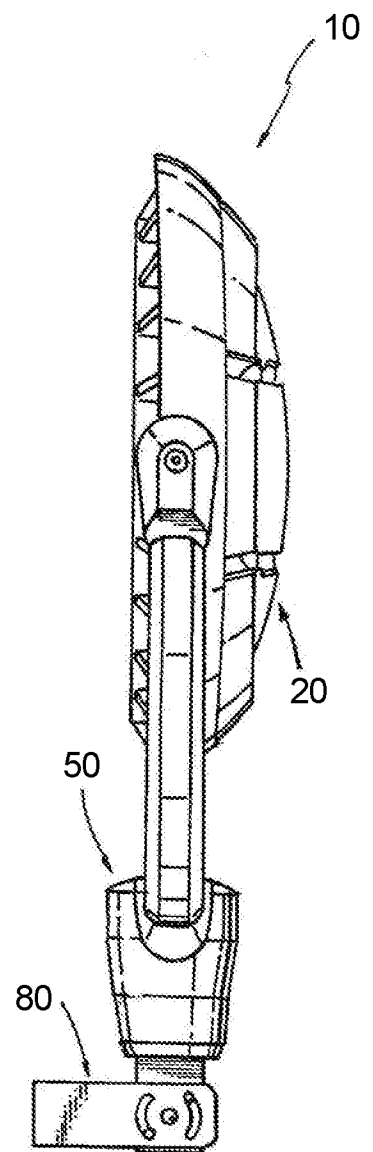


Fig. 10

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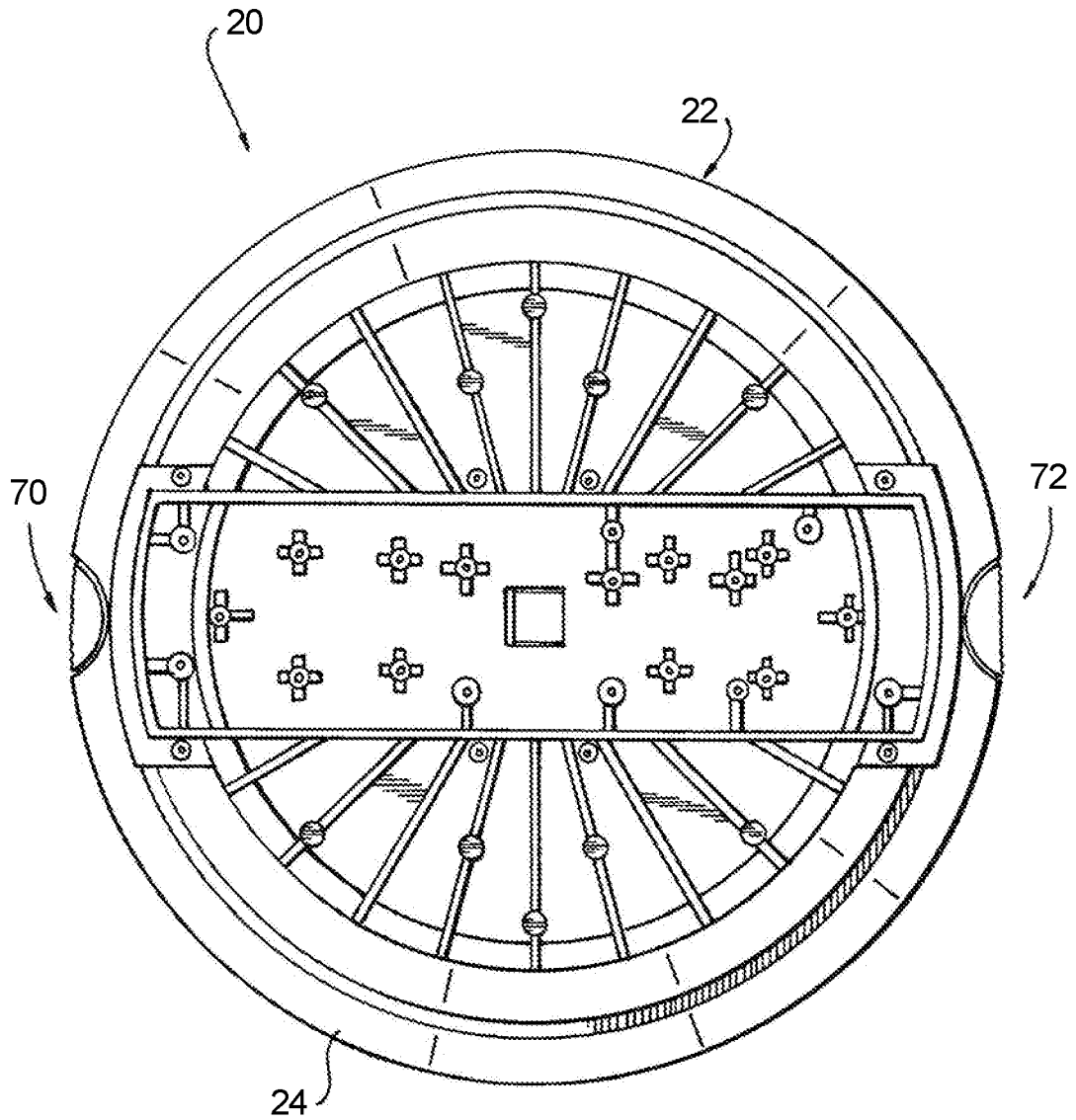


Fig. 11

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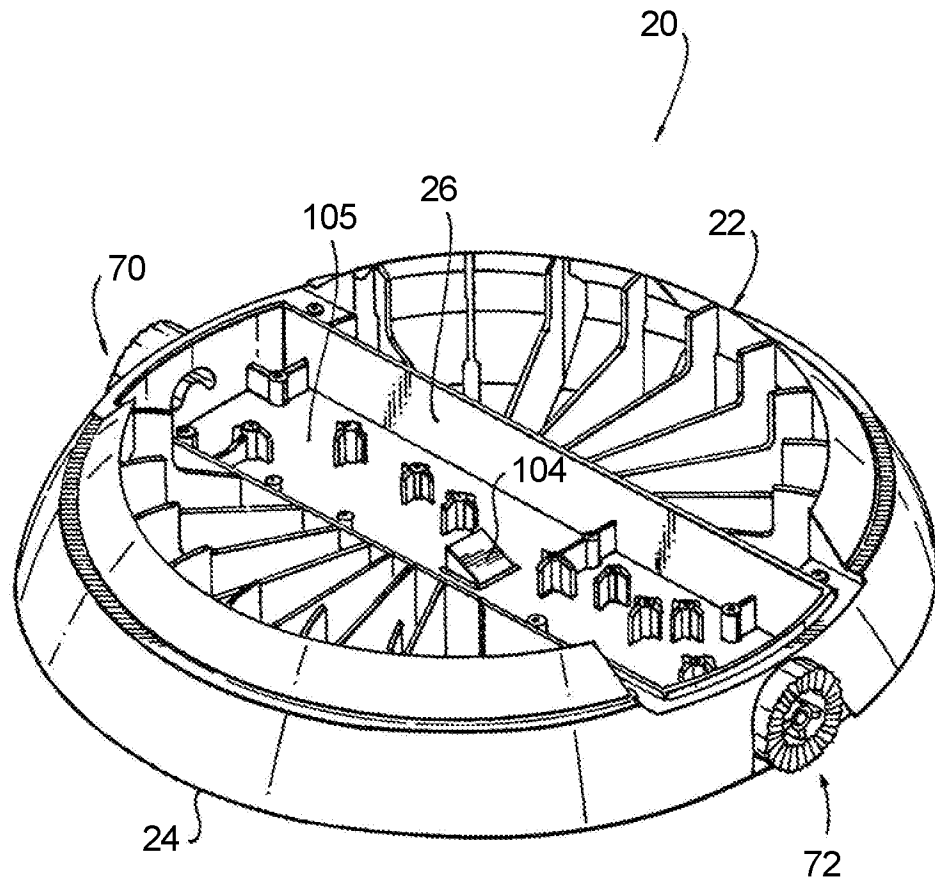


Fig. 12

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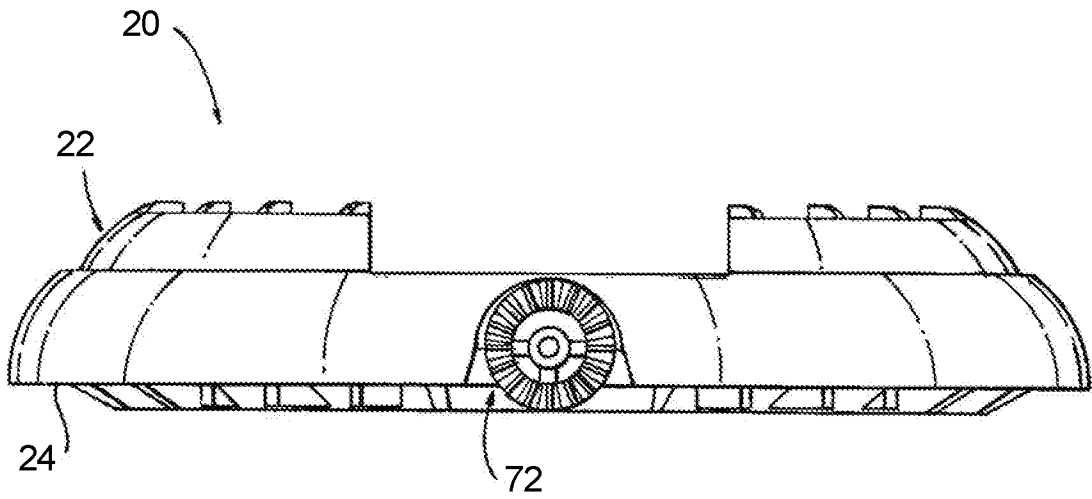


Fig. 13

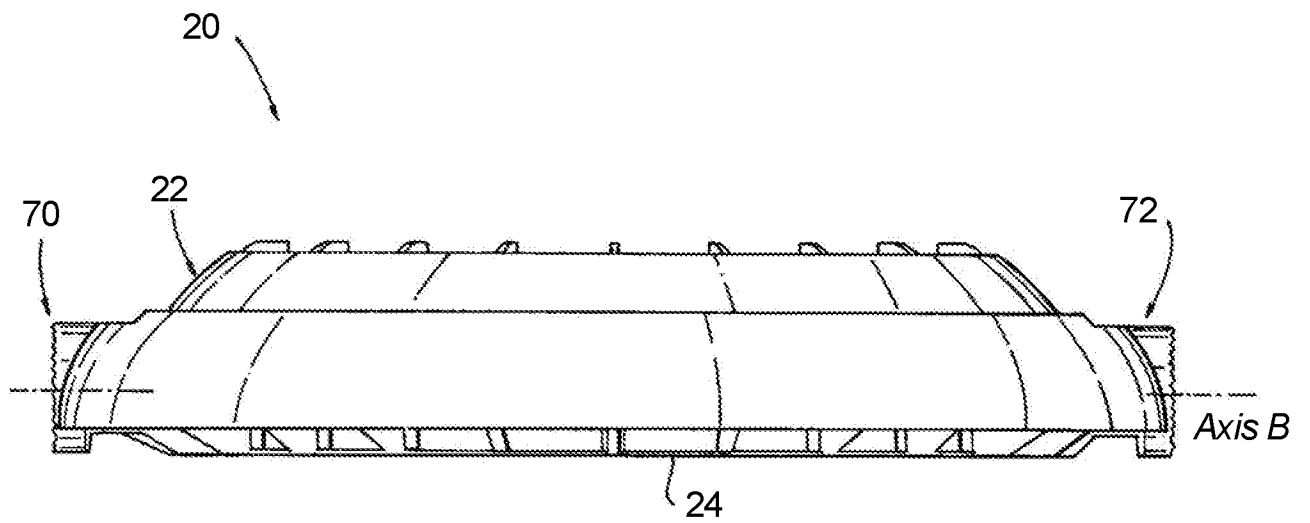


Fig. 14

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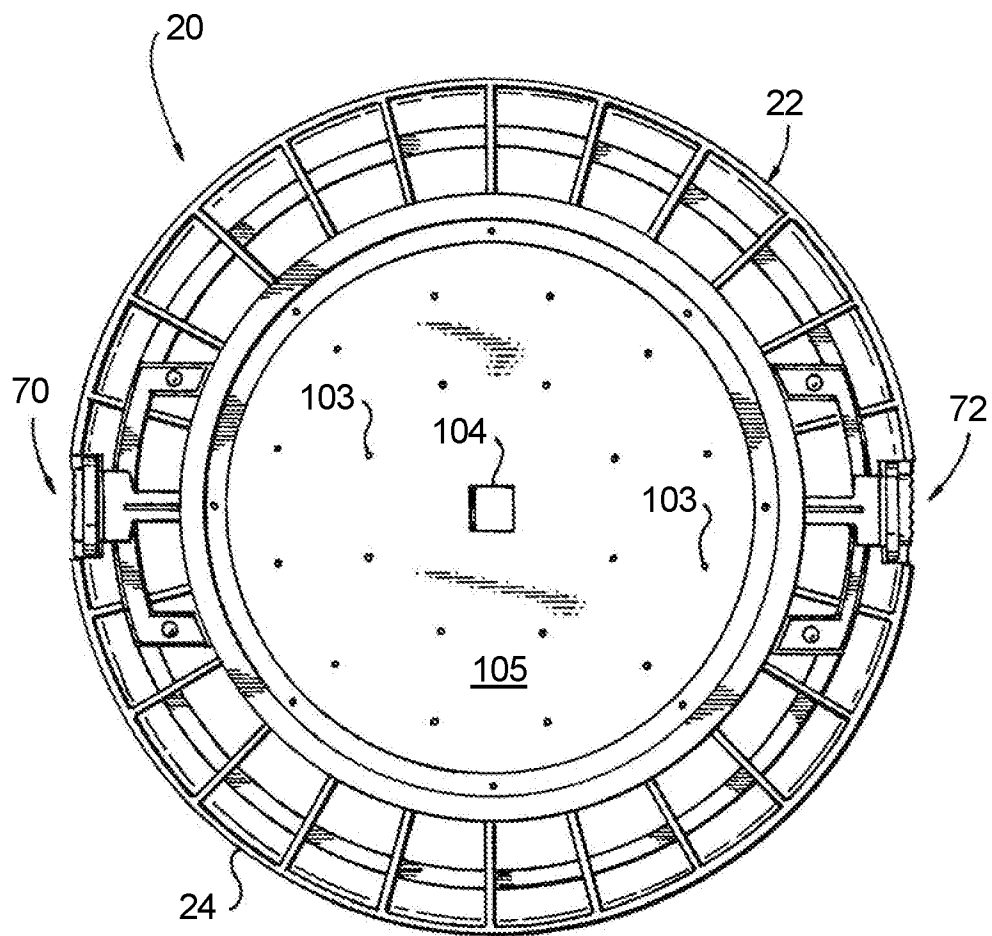
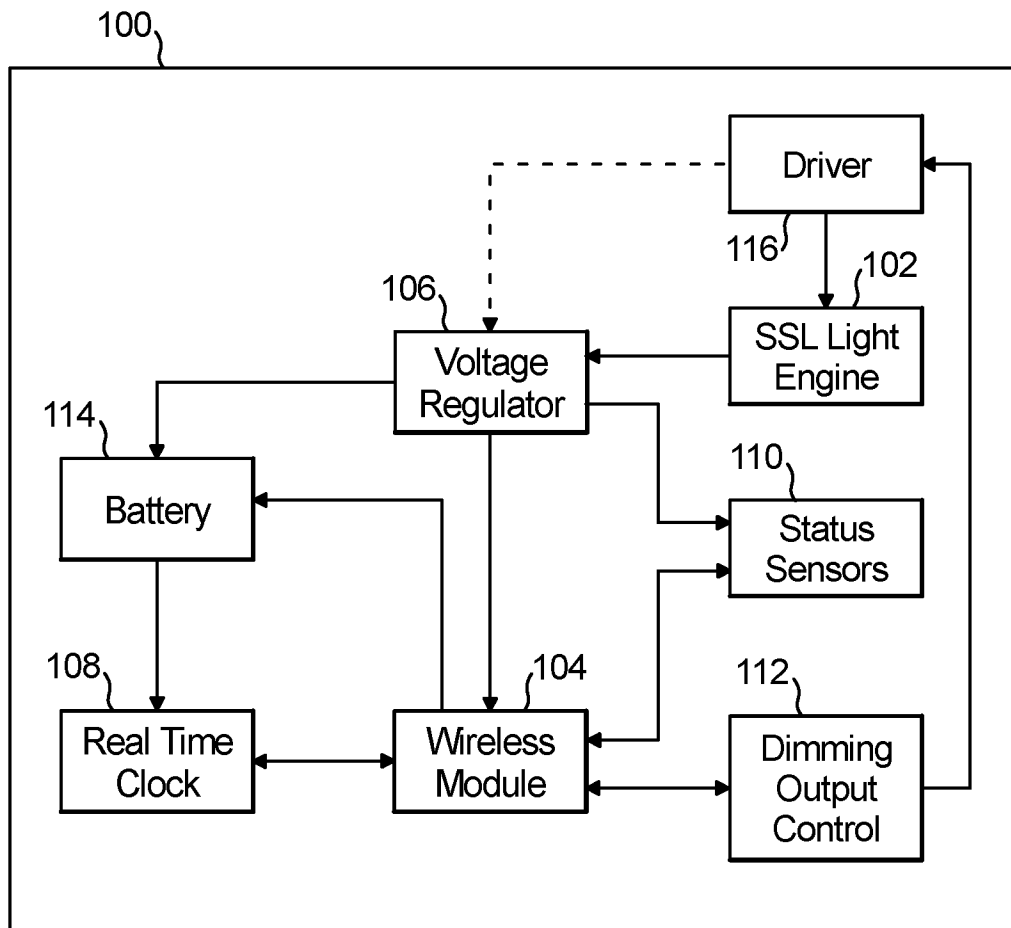
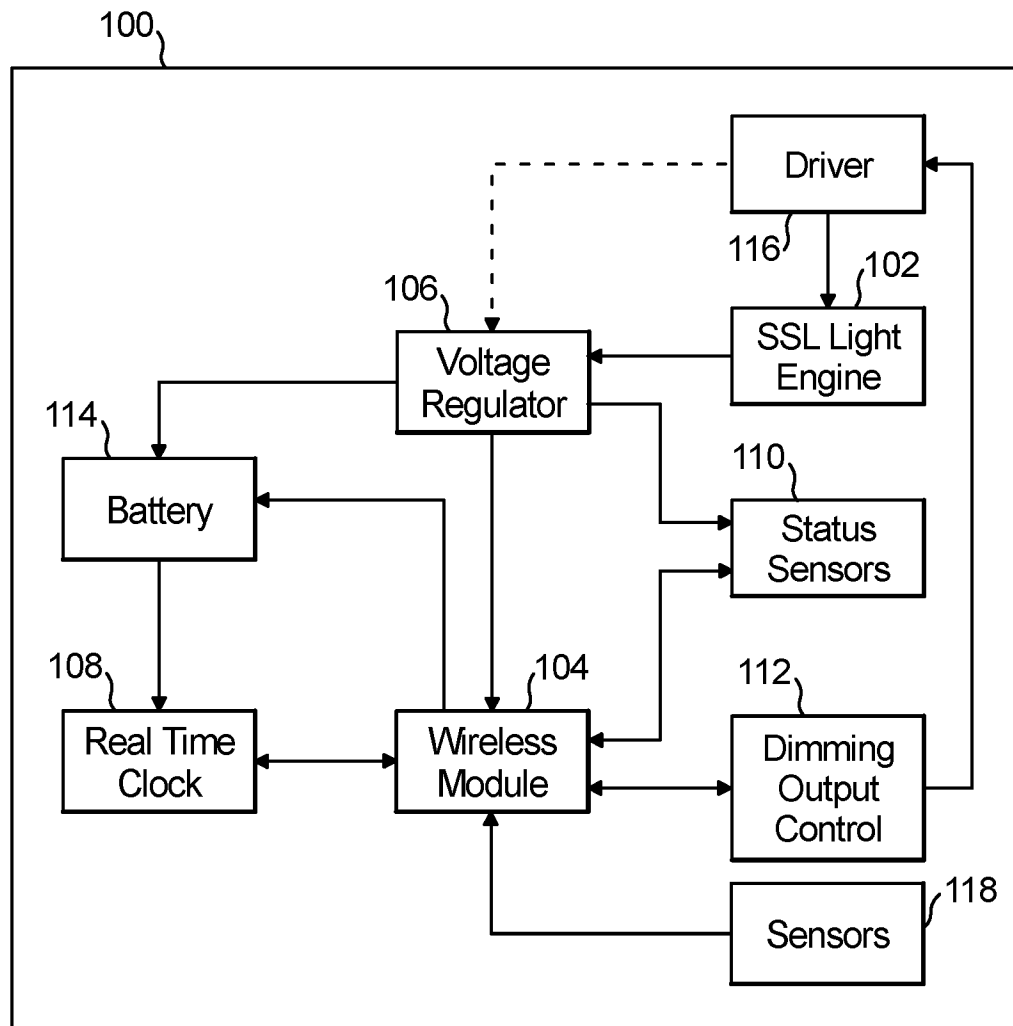


Fig. 15

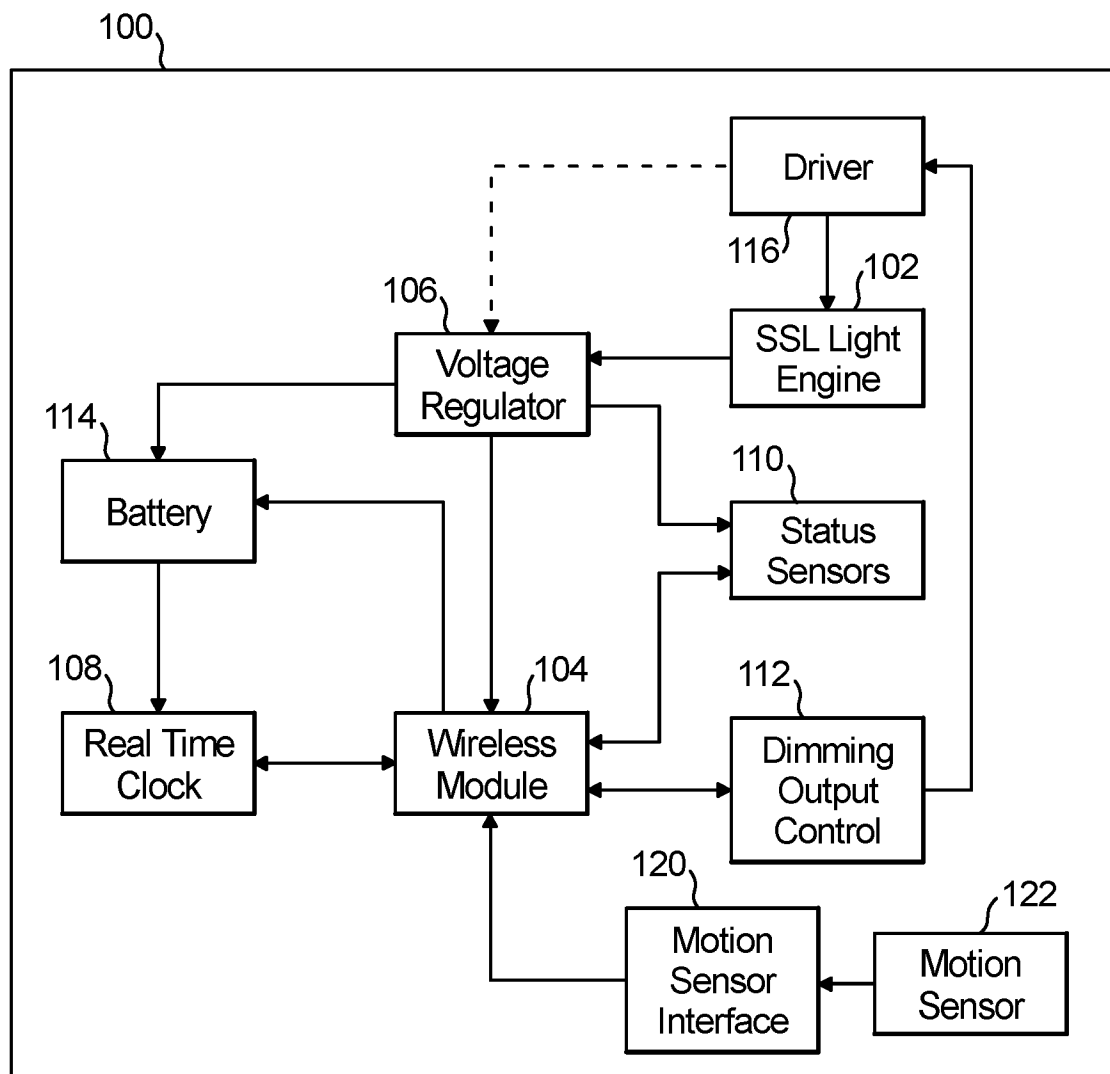
10/14

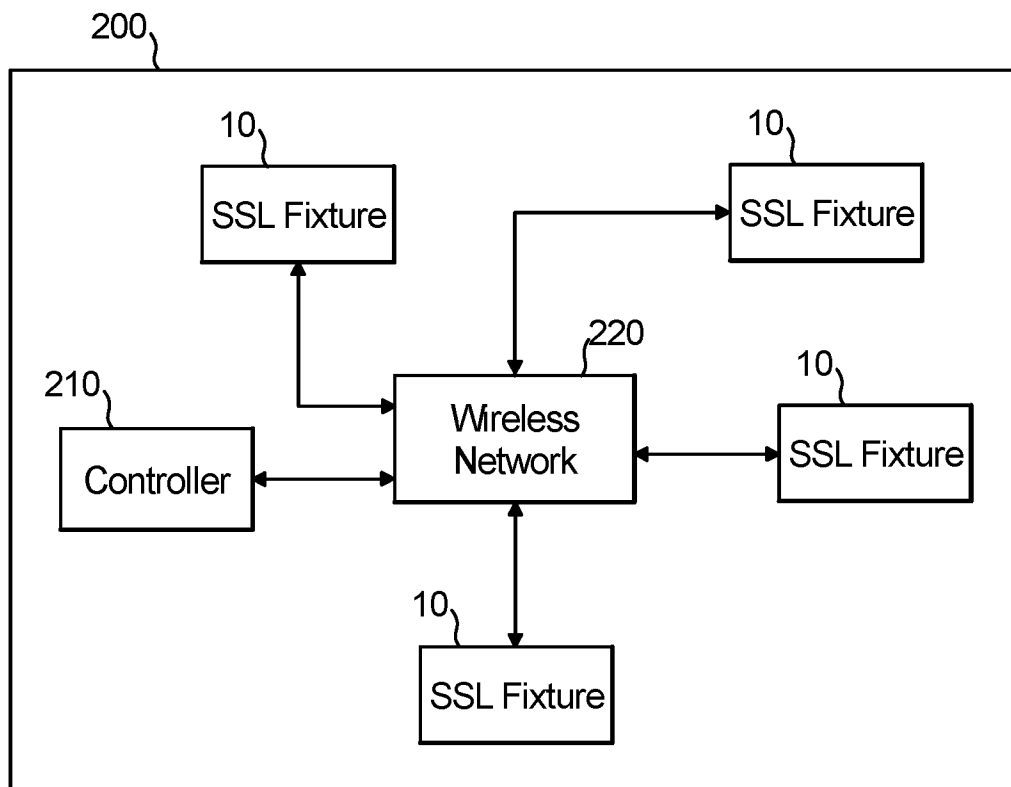
**Fig. 16**

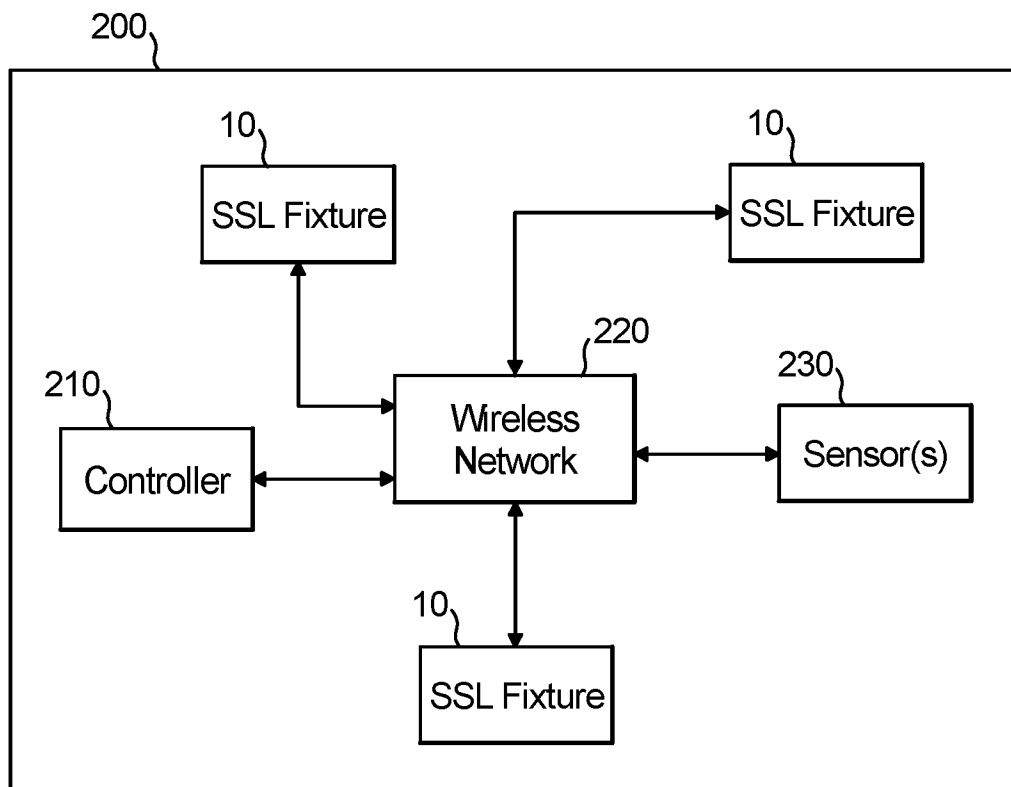
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**Fig. 17**

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**Fig. 18**

**Fig. 19**

**Fig. 20**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2016/030205

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F21S 8/08; F21S 8/00 (2016.01)

CPC - F21S 6/003; F21V 21/30 (2016.05)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC - F21S 8/00; F21S 8/08

CPC - B60Q 1/06; B60Q 1/124; B60Q 1/24; F21S 6/003; F21V 21/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC - 315/291; 315/312; 362/227; 362/418; 362/419; 362/426; 362/427; 362/428;
362/429; 362/430; 362/431; 362/543; 362/249.030; 362/249.020 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Orbit, Google Patents, Google Scholar, Google

Search terms used: light, lamp, or luminaire, fixture, support, post, couple, housing, enclosure, body, case, yoke, pivot, rotate, turn, wireless, control, network, joint, connect, couple, lock

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,402,352 B1 (SUMMERFORD et al) 11 June 2002 (11.06.2002) entire document	1-4
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Y	US 6,966,679 B2 (MATTS et al) 22 November 2005 (22.11.2005) entire document	5, 17
Y	US 6,789,924 B2 (YUEN) 14 September 2004 (14.09.2004) entire document	6, 18
Y	US 2014/0028200 A1 (VAN WAGONER et al) 30 January 2014 (30.01.2014) entire document	7-20
A	US 6,220,726 B1 (GORDIN) 24 April 2001 (24.04.2001) entire document	1-20
A	US 2005/0047142 A1 (LUI) 03 March 2005 (03.03.2005) entire document	1-20
A	US 2009/0310375 A1 (MANSCHER) 17 December 2009 (17.12.2009) entire document	1-20
A	US 6,877,881 B2 (TSAO) 12 April 2005 (12.04.2005) entire document	1-20

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

04 July 2016

Date of mailing of the international search report

08 AUG 2016

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